

A' Sub 11. A method of disassembling an injection molding system including a mold, a clamp plate coupled to the mold, a manifold having at least one injection nozzle coupled thereto, the manifold being seated between the mold and clamp plate, and a valve pin actuator mounted in the clamp plate and including a piston slidably mounted therein having a valve pin coupled thereto so that movement of the piston causes axial movement of the valve pin, wherein the valve pin extends from the clamp plate and into the manifold, the method comprising the steps of:

(A) decoupling the valve pin from the piston while clamp plate remains coupled to the mold and the valve pin actuator remains mounted in the clamp plate; and

(B) decoupling the clamp plate and the valve pin actuator, including the piston, from the mold while the valve pin remains extended into the manifold.

2 12. The method of claim 11, wherein steps (A) and (B) are performed while the valve pin remains stationary and mounted to the manifold.

3 13. The method of claim 11, wherein the valve pin is coupled to the piston via a ring, and step (A) includes decoupling the ring.

4 14. The method of claim 11, wherein step (B) is performed while the piston remains mounted in the valve pin actuator.

5 15. The method of claim 11, wherein the piston forms a plurality of seals within the valve pin actuator, and step (B) is performed while keeping the plurality of seals intact.

16. An injection molding system comprising:

a mold;

a clamp plate coupled to the mold;

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a manifold having at least one injection nozzle coupled thereto, the manifold being seated between the mold and clamp plate;

a valve pin actuator mounted in a recess in the clamp plate so that the valve pin actuator is accessible from above the clamp plate, the valve pin actuator including a piston slidably mounted therein; and

a valve pin removably coupled to the piston so that movement of the piston causes axial movement of the valve pin, the valve pin extending from the clamp plate into the manifold, wherein the valve pin can be decoupled from the piston while the clamp plate and the valve pin actuator are coupled to the mold so that when the valve pin is decoupled from the piston the clamp plate and the valve pin actuator, including the piston, can be removed from the mold while the valve pin remains extended into the manifold.

17. The injection molding system of claim 16, further comprising an actuator cap to which the valve pin is coupled, the actuator cap being removably coupled to the piston.

18. The injection molding system of claim 17, further comprising a ring for removably coupling the actuator cap to the piston, wherein when the ring is removed, the actuator cap and the valve pin are decoupled from the piston and the clamp plate and valve pin actuator, including the piston, can be removed from the mold while the valve pin remains extended into the manifold and the actuator cap remains mounted to the manifold.

19. The injection molding system of claim 17, wherein the valve pin includes a valve pin head that is threadably mounted into said actuator cap so that rotation of the actuator cap when the actuator cap is decoupled from the piston enables adjustment of the axial position of the valve pin.

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20. The injection molding system of claim 17, further comprising an actuator support coupled to the top of the manifold, wherein the valve pin extends through the axial support and the actuator support limits axial movement of the actuator cap toward the manifold so that when the actuator cap bears against the actuator support the valve pin is in a lowermost position.

21. The injection molding system of claim 16, wherein the valve pin is adapted to seat and unseat at a gate of the mold and the valve pin actuator, including the piston, can be removed from the mold while the valve pin is seated at the gate.

22. The injection molding system of claim 16, wherein the clamp plate and the valve pin actuator, including the piston, can be removed while the piston remains mounted in the valve pin actuator.

23. The injection molding system of claim 16, there being a plurality of seals formed between the piston and a surface of the valve pin actuator, wherein the plurality of seals remains intact when the clamp plate and the valve pin actuator, including the piston, are removed.

24. A valve pin actuator and assembly for use in an injection molding system including a mold, a clamp plate coupled to the mold, a manifold having at least one injection nozzle coupled thereto, the manifold being seated between the mold and clamp plate, the valve pin actuator to be mounted in a recess in the clamp plate so that the valve pin actuator is accessible from above the clamp plate, the valve pin actuator and assembly comprising:

- an actuator cylinder to be mounted in the clamp plate;
- a piston slidably mounted in the actuator cylinder; and
- a valve pin removably coupled to the piston so that movement of the piston causes axial movement of the valve pin, the valve pin adapted to extend from the clamp plate and into the

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manifold, wherein the piston and the actuator cylinder can be decoupled and lifted away from the valve pin while the valve pin remains extended into the manifold.

25. The injection molding system of claim 24, wherein the clamp plate and the valve pin actuator, including the piston, can be removed while the piston remains mounted to the valve pin actuator.

26. The injection molding system of claim 25, there being a plurality of seals formed between the piston and the actuator cylinder, wherein the plurality of seals remains intact when the clamp plate and the valve pin actuator, including the piston, are removed.

*Sub B<sup>2</sup>* 27. A method of adjusting the axial position of a valve pin for use in an injection molding system including a mold, a clamp plate coupled to the mold, a manifold having at least one injection nozzle coupled thereto, the manifold being seated between the mold and clamp plate, and a valve pin actuator mounted in the clamp plate and including a piston slidably mounted therein having the valve pin coupled thereto so that movement of the piston causes axial movement of the valve pin, wherein the valve pin extends from the clamp plate and into the manifold, the method comprising the steps of:

(A) decoupling the valve pin from the piston while clamp plate remains coupled to the mold and the valve pin actuator remains mounted in the clamp plate; and

(B) adjusting the axial position of the valve pin while the valve pin is decoupled from the piston, while the clamp plate and valve pin actuator remain coupled to the mold and while the valve pin remains extended into the manifold.

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